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FIG. 1A

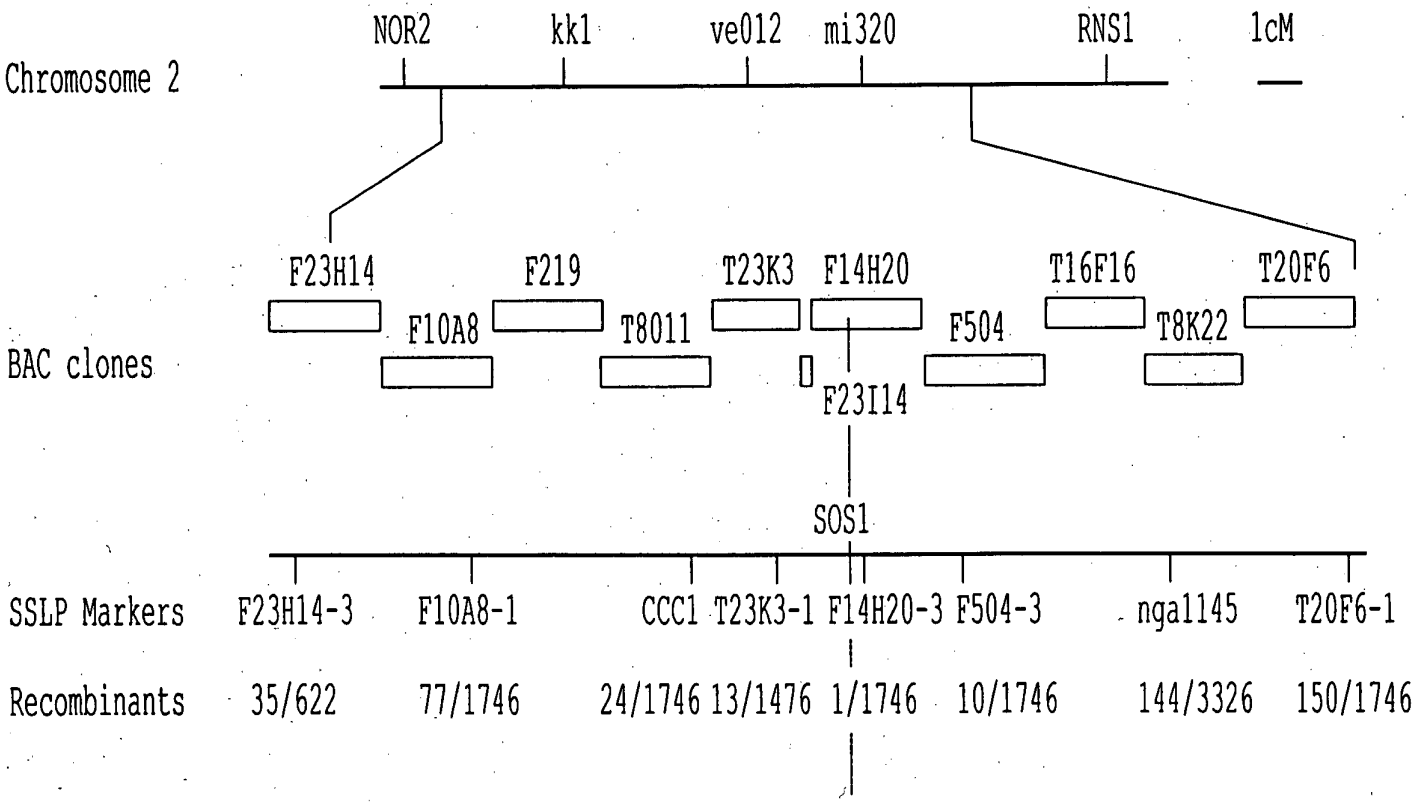
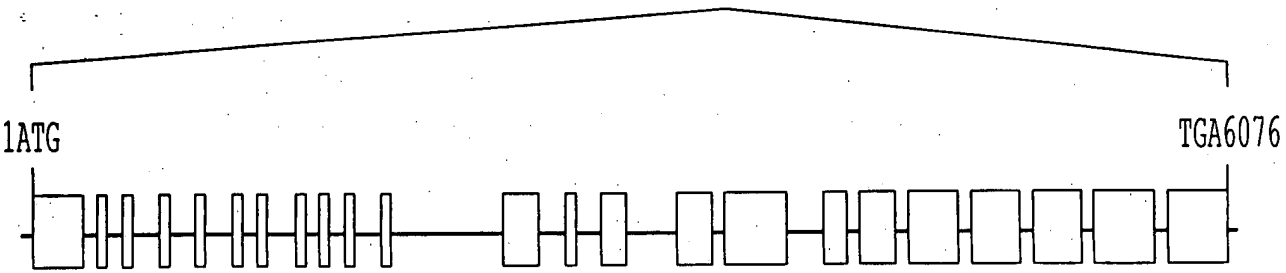

Chromosome 2
NOR2
kk1
ve012
mi320
RNS1
1cM
BAC clones
F23H14
F10A8
F219
T8011
T23K3
F14H20
F23I14
F504
T16F16
T8K22
T20F6
SOS1
SSLP Markers
F23H14-3
F10A8-1
CCC1
T23K3-1
F14H20-3
F504-3
nga1145
T20F6-1
Recombinants
35/622
77/1746
24/1746
13/1476
1/1746
10/1746
144/3326
150/1746

FIG.1B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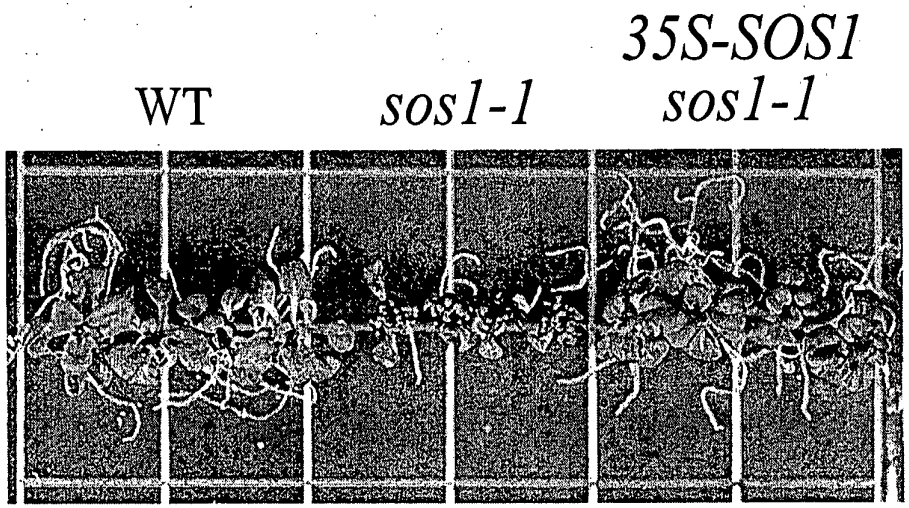

FIG. 2

FIG.3A

```
MTTVIDATMAYRFLEEATDSSSSSSSSKLESSPVDAVLFVGMSLVLGIAS
RHLLRGTRVPYTVALLVIGIALGSLEYGAKHNLGKIGHGIRIWNEIDPEL
LLAVFLPALLFESSFSMEVHQIKRCLGQMVLLAVPGVLISTACLGSLVKV
TFPYEWDWKTSLLLGGLLSATDPVAVVALLKELGASKKLSTIIEGESLMN
DGTAIVVFQLFLKMAMGQNSDWSSIIKFLLKVALGAVGIGLAFGIASVIW
LKFIFNDTVIEITLTIAVSYFAYYTAQEWAGASGVLTVMTLGMFYAAFAR
TAFKGDSQKSLHHFWEMVAYIANTLIFILSGVVIAEGILDSDKIAYQGNS
WRFLFLLYVYIQLSRVVVVGVLYPLLCRFGYGLDWKESIILVWSGLRGAV
ALALSLSVKQSSGNSHISKETGTLFLFFTGGIVFLTLIVNGSTTQFVLRL
LRMDILPAPKKRILEYTKYEMLNKALRAFQDLGDDEELGPADWPTVESYI
SSLKGSEGELVHHPHNGSKIGSLDPKSLKDIRMRFLNGVQATYWEMLDEG
RISEVTANILMQSVDEALDQVSTTLCDWRGLKPHVNFPNYYNFLHSKVVP
RKLVTYFAVERLESACYISAAFLRAHTIARQQLYDFLGESNIGSIVINES
EKEGEEAKKFLEKVRSSFPQVLRVVKTKQVTYSVLNHLLGYIENLEKVGL
LEEKEIAHLHDAVQTGLKKLLRNPPIVKLPKLSDMITSHPLSVALPPAFC
EPLKHSKKEPMKLRGVTLYKEGSKPTGVWLIFDGIVKWKSKILSNNHSLH
PTFSHGSTLGLYEVLTGKPYLCDLITDSMVLCFFIDSEKILSLQSDSTID
DFLWQESALVLLKLLRPQIFESVAMQELRALVSTESSKLTTYVTGESIEI
DCNSIGLLLEGFVKPVGIKEELISSPAALSPSNGNQSFHNSSEASGIMRV
SFSQQATQYIVETRARAIIFNIGAFGADRTLHRRPSSLTPPRSSSSDQLQ
RSFRKEHRGLMSWPENIYAKQQQEINKTTLSLSERAMQLSIFGSMVNVYR
RSVSFGGIYNNKLQDNLLYKKLPLNPAQGLVSAKSESSIVTKKQLETRKH
ACQLPLKGESSTRQNTMVESSDEEDEDEGIVVRIDSPSKIVFRNDL
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TM1 TM2 TM3 TM4 TM5 TM6 TM7 TM8 TM9 TM10 TM11 TM12

FIG. 3B

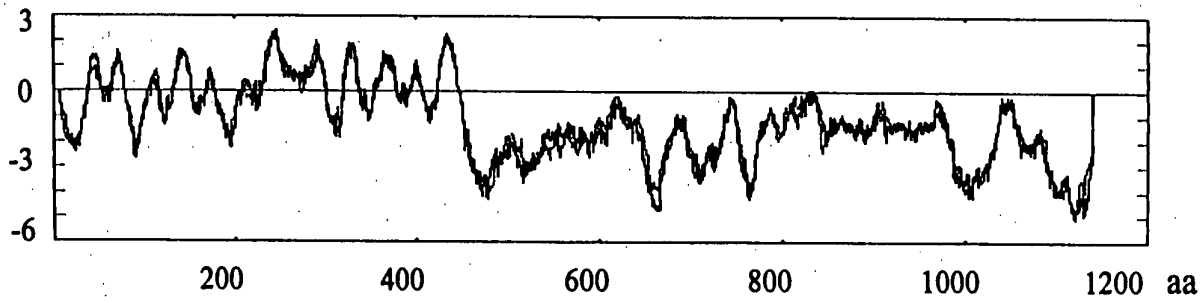

FIG. 4A

```
SOS1     1  MTTVIDATMAYRFLEEATDSSSSSSSSKLESSPVDAVLFVGMSLVLGIASRHLLRGTRV
NhaP     1                                      MLDLVAAFIALTTLLTYVN---YRFTRE
NHE1    61  VTTAPSDPVHHPDDRNLTNLHIEHGAKTLRKAFPVLDIDYFHVRTPFEISLWILLACLMK

SOS1    60  PYTVATLVLGTALGSLEYGAKHN---LGKIGHGIRIWNEIDPELLLLAVFLPALLFESSFS
NhaP    26  PPTLGVMATAIVFSLLVQGESELGYPLLEVEMQEIIRRIDFSEVLMTVFLPALLFAGALH
NHE1   121  IGFHVVPTISSLVPESCLLIVVGLLVGGLIKGVGETPPFLQSDVFFLFLLPPIILDAGYF

SOS1   117  MEVHQLKRCLGQMVLLAVPGVLISTACLGSLVKVTFP------YEWDWKTSLLLGGLLSA
NhaP    86  VDLSDLRSYKWPIGLLATAGVLIATFVIGGLAYYTFPEFG---WQVDETYCLLFGALISP
NHE1   181  LPLRQFTENLGTILIFAVVGTLWNAFFLGGLFYAVCLVGGEQINNIGLPDTLLFGSIISA

SOS1   171  TDPVAVVAILKELGASKKLSTLIEGESLMNDGTAIVVFQLFL-KMAMGQN--SDWSSIIK
NhaP   143  TDPIAVIGILKSAGAPKPLATTIVGESLFNDGTAVVVFAIILGILQTGEA--PTVSATAI
NHE1   241  VDPVAVVAVFEEIHINELLHILVFGESLLNDAVTVVLYHLFEEFANYDSIGISDIFLGFL

SOS1   228  FLLKVALGIVGIGFAFGIASVIWLKFIFNDTVIEITLTLAVSYFAYYTAQEWAGASGVLT
NhaP   201  LFVQEATGGVVFGAVLGYGVFWMMRGLD-QYQVEVMLTLALVIGGAALAARLHVSAPIAM
NHE1   301  SFFVVALGGVFVGVVYGVIAAFTSRFTSHIRVIEPLFVFLYSYMAYLSAELSHLSG-IMA

SOS1   288  VMTLGMFYAAFASTAFKGDSQRSHHTFWEMVAYIANTLIFILSGVVIAEGILDSDKIAYQ
NhaP   260  VVAGLLIGNHGRHYAISDETRRYVDKFWELIDEILNALFFALIGLEILLLPFSWLTVAA-
NHE1   360  LIASGAVMRPIVEANISHKSFTLIRYFLKMWSSVSETLIFIFLGVSTVAGSHQWN-----

SOS1   348  GNSVRFLFLLYVAYQLSRVVVVGVLYPLLCRFGYGLDWKES---IILVWSGLRGAVALAL
NhaP   319  --A--FAVG--GAVLVSRPLTVGPAILVLRRFRGANRQVPAGTIRILVWGGLRGGVSVAL
NHE1   415  ---VTFVISTLLFCLFARVLGVLVLTWFINKFRIVKLTPKDQ--FIIAYGGLRGAIAFSL

SOS1   405  SLSVKQS--SGNSHISKETGTLFLF--FTGGIVFLTLLVNGSTTQFVLRL
NhaP   373  ALSLPLG--PERDLILSLTYIVVLVSILLQGLSIGPLVRRIYAGQPLEKS
NHE1   470  GYLMDKKHFPMCDLFLPAIITVLFFTVFVQGMTIRPLVDLLAVKKKQETK
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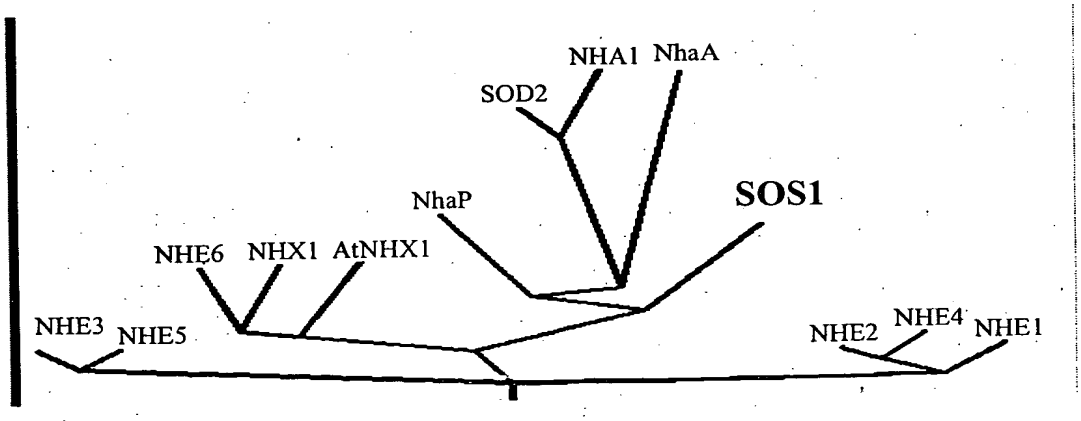


FIG. 4B

FIG. 5

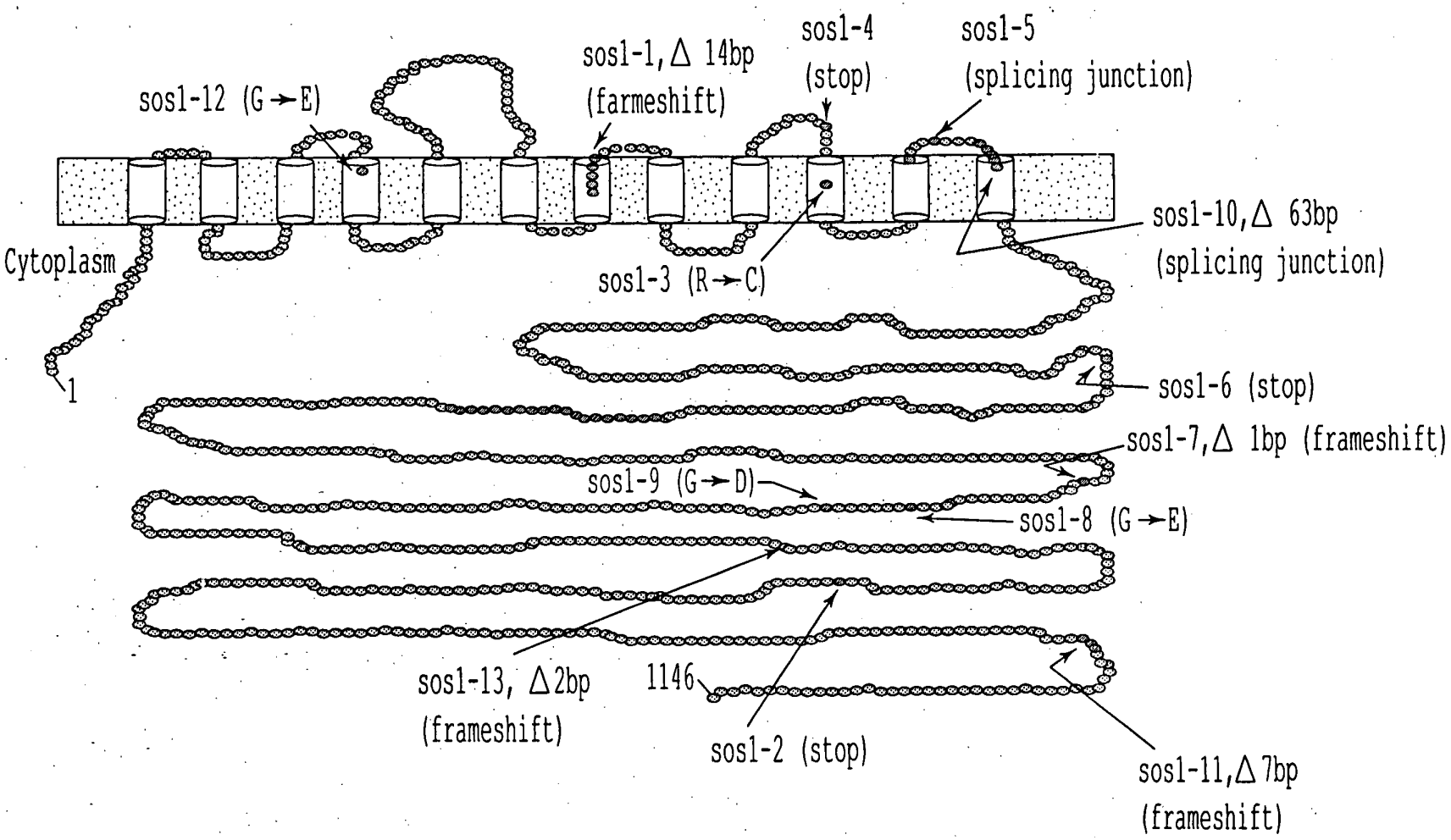

sos1-12 (G→E)
sos1-1, Δ 14bp
(farmeshift)
sos1-4
(stop)
sos1-5
(splicing junction)
sos1-10, Δ 63bp
(splicing junction)
Cytoplasm
sos1-3 (R→C)
1
sos1-6 (stop)
sos1-7, Δ 1bp (frameshift)
sos1-9 (G→D)
sos1-8 (G→E)
sos1-13, Δ2bp
(frameshift)
1146
sos1-2 (stop)
sos1-11, Δ7bp
(frameshift)

FIG. 6A

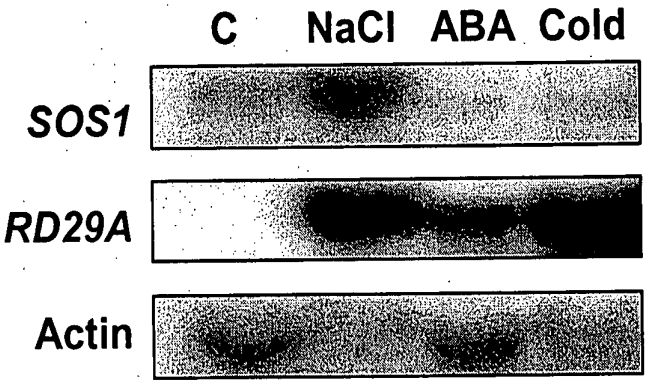
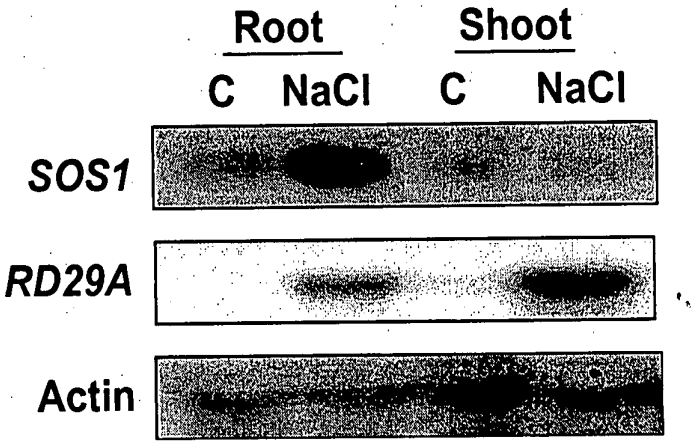


FIG. 6C



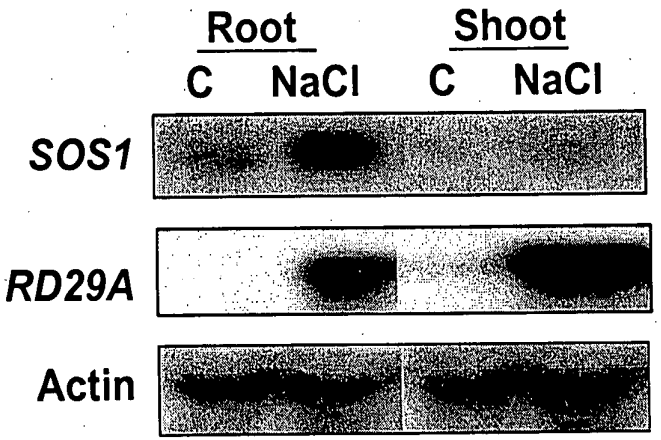


FIG. 6B

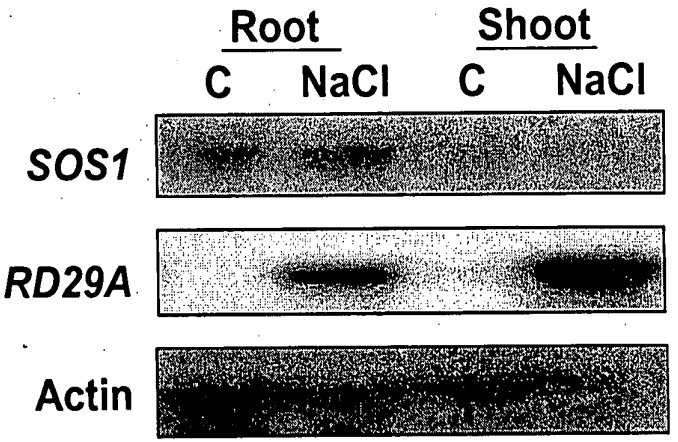


FIG. 6D

1 atgacgactg taatcgacgc gacgatggcg tatagatttc tggaggaagc gaccgattcg
61 tcttcttctt cttcttcttc caaactagaa tctagccctg tcgacgccgt tctcttcgtc
121 ggaatgtctc tggtactcgg tattgcttct aggcacttgc ttcgtggaac tagggttcct
181 tacactgtcg ctcttctcgt tatcggaatt gctcttggat ctctcggttc gatttcgttc
241 catggaattt ctgatttctt catctgtttt aatccttgaa gtcaacgtaa tcatgcttaa
301 ttgctaattc atgttgtttg gtgtttcaga atatggagct aaacataacc ttggaaagat
361 cggccatgga attcgtatct gtaagttttt agtttcgaat ttttcttctc ttccatggct
421 ggctttgtaa gaactataga atcaatgtta ttgtgcaggg aatgagatcg atccagaact
481 tcttttagct gtttttcttc cggctcttct tttcgagagt tcgttttcaa tggaagttca
541 ccaaattaag gtttattcct ctggctctaa ttcctagtta agcttaaagg ttaagagaaa
601 taggtactga atacttgcat gattctttag aggtgtctgg gacaaatggt gttacttgct
661 gtccctggag ttcttatttc aacagcttgt cttggatcgc ttgtgaaggt atgaattagc
721 ctggttggta ttaagtagct gtcctgaaaa caaagaaaga caaatcgatt attatgttat
781 gaaactatac ttgctatatg caggtcacgt ttccgtatga atgggactgg aaaacgtcct
841 tgttgcttgg gggacttta agtgctactg atccggttgc tgttgttgct ttgctaaagg
901 agcttggtgc tagtaagaag ctaagcacca taattgaagg ggaatccctg atgaatgatg
961 ggtaaatgac gttatcttct gtcatggttt ggttagtttt gacatttatg ctcactcttc
1021 atgattttta acaacaattc caggacggcg attgttgttt tccagttatt cttaaagatg
1081 gctatggggc aaaactctga ctggagttct ataatcaaat ttctgcttaa agtcgcactt
1141 ggagcgtatg tcttgatctt ttttcatctg ttgttagtga tatcaagttg ctgctgtgtt
1201 cttatcagtc caacgtgttc ttctgtctat ttagtgtagg cattggtctg gcgtttggca
1261 ttgcatcagt tatttggctc aagttcatat tcaatgacac tgtaatagag attactctta
1321 caattgcagt gagctatttc gcatactaca ctgtacgtct ttctgtagac cttgaattcc
1381 tgtgctaaga tattctcttt gtagtaaaac tgagagttta ttgtgtgaca ggctcaagag
1441 tgggctgggg cttctggtgt tttgacggtc atgactttgg gcatgtaaat ttcagtgatc
1501 tcgttatttt ttttttccct ttcttttgtt atcatttaag aagtctcttc tcataaaata
1561 actgtaacag gttttatgct gcatttgcaa ggacagcctt taaaggtgac agtcaaaaaa
1621 gcttgcatca cttctggtat ttccagaact tgtggaattt ggacttgttt ttttatattg
1681 taactctatg taaaaggttg atctgtgtga tataaatttt cccggtaact tgtgcaggga
1741 aatggttgca tatattgcaa acactttgat atttatcctc aggtaagggt aaattttata
1801 gactcatatc atgcttgtgc ttgccaaccc taaaatagaa gctcatgggt agaaaaaaga
1861 gctattttac tgcagtctac tctttagcct ggtgttgcaa tattgactgt gtttctcgtt
1921 ttatgtttgc agtggtgttg tcattgctga aggcattctc gacagtgata agattgccta

FIG. 7A

1981 ccaaggtgcc attatttaat gttgatagtg tacagtattt ttttcctagc taaagtaaat
2041 tttgtgaaca tagttttgtc tgcattttcg acagttcact gttaattgaa gatgagatct
2101 aagtcattac ataggactcc cacctgttat catagttttc tgtcgttgtt aacacacctt
2161 actgttcatg gtctttggtt ctcgaaggat cactaattcc ataacgtgaa tcagttacaa
2221 gaataagaaa aaaactggca ttattggtta cgaaatattg agcgaaagtt accactgtgc
2281 taggactgag acaattgtat tctttcacca gtctgttatt attattaagt acctgttaga
2341 gatgtactgt cttggaacca tatatttttt ctctggaacc atatctgcat aaggcacatg
2401 atatacttaa ctttaactat tttttatatt ttggatctaa caactcttca cgacccaaat
2461 ttcttacagg gaattcatgg cgatttcttt ttctgctata cgtttacatc caactatcgc
2521 gtgttgttgt tgttggagtt ctatatccac ttttatgtcg ttttggctat ggtttggatt
2581 ggaaagaatc cattatactc gtatggtctg gtttgagggg cgcagtggct cttgcacttt
2641 ctttatccgt gaaggttaat tttaagaaca tctgttaaag ttgttcttct ctcttaaatt
2701 tctgcacaat gttttttcc agccacattg attctgtgct gacttactcg cactcatttg
2761 attcagcaat caagcggaaa ttcacatatc agcaaggaga ctggaacatt ggtaagttag
2821 tctaaagatg ttattgacaa cttaaaatga ttatgcaaat tattgttttg tctcttcata
2881 ttctcagttc ttttgcagtt tcttttcttc acgggtggaa ttgtgttcct aactctgata
2941 gttaatggat ccactaccca atttgttcta cgccttcttc gcatggatat tttaccagcc
3001 cccaaggtca aaaacttctc tcatacgaat aactttccga gttttaagta atcaaatata
3061 tgtgtaaaca gagatttttt tgcttatgct ttgtattcat gtgtaagtga ccgtgttagc
3121 ctgagtctga gcctttaagc tgtatagttc aatagggtct gtatgttcta gtcagtaatg
3181 tattcgaaga accttattag aaaccacttt ccttttgaca gaaacgaata ttggaatata
3241 caaagtacga aatgttgaat aaggccttac gagcgtttca agatctagga gacgatgagg
3301 agctaggacc tgctgactgg cctacagttg aaagttatat ttcaagccta aaaggttcag
3361 aaggggaact agttcatcat cctcacaatg gctctaaaat tggaagtctt gaccctaaaa
3421 gtttaaagga catacgtatg cggttcttaa atggtagtta tgatcatgta ccctccaata
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3601 gcagtcagtg gatgaggcgc ttgatcaggt ttctacaact ttatgtgatt ggagaggtct
3661 aaaaccacat gtcaatttcc caaattacta caactttctt cattctaaag ttgtcccacg
3721 caagttggtc acatactttg ctgtcgaaag actagaatct gcttgctaca tttctgctgc
3781 gtttcttcgc gcacatacaa ttgcacgaca gcaattgtat gattttctag gtatgtacaa
3841 tccatactct gcagtctgca tcacactttg aaaacaatga ctaagaataa aacttgtacc
3901 gtatcatcat taattgtcag agtttttgtt tgcaagtatc tcaacttagt aagaacaata
3961 cattaaccca accctagttt tgtctcatac ttatctatct tctctacaca ggggagagta

FIG. 7B

4021 atattggttc cattgtaatc aatgaaagtg aaaaggaagg agaggaagca aaaaagttct
4081 tggaaaaagt ccgatcttca tttcctcagg ttgagagtct tgtcatttct ttcgggtgac
4141 ttatctttct tgcggtgagg cacatataat ctttgattaa cattggttte aggttctccg
4201 tgttgtgaaa acaaaacaag taacatattc agtgttgaat catttactcg gttacattga
4261 aaacctcgag aaggttggct tgttggagga aaaagaaatc gctcatcttc atgatgctgt
4321 ccaggtacca aattaaagaa tctcattcct tcaactatag tcttgtctct tttgtcttat
4381 gcttttggtc aaatctatct ctgcagaccg gcttgaaaaa gcttttgaga aaccctccaa
4441 tagttaaact tccaaaattg agcgacatga tcacctcaca tccgttatcg gttgctcttc
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4561 tcacgcttta taaagaaggt tcaaagccaa ctggagtctg gcttattttt gatggcatcg
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4741 ctcgctgcat ccaacttttt ctcacggtag tacattggga ctctacgaag tcctcactgg
4801 gaagccatat ctgtgcgact tgattacaga ttctatggtt ctttgctttt tcattgatag
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4981 tttcggtttt ttttgtttgc aggaaagtgc attggttctt ctcaaactct tgcgtcctca
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5101 acttacaaca tatgtgacgg gagaatcaat cgaaatcgac tgcaacagca ttggtttatt
5161 attagaagga ttcgtaaaac cggttggtat caaagaagag cttatatcat ctcccgccgc
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5281 attgcacagt acagcaggat caaacctttt taaatgtcag cgaatgatat aaatcgaatt
5341 aaatcaaaaa tgtgttttgt ttttttgacc acaggtatca tgagagtcag tttctcacaa
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5461 tttggagctg ataggactct acatcgaaga ccatcttcgt taacaccacc acgtagctca
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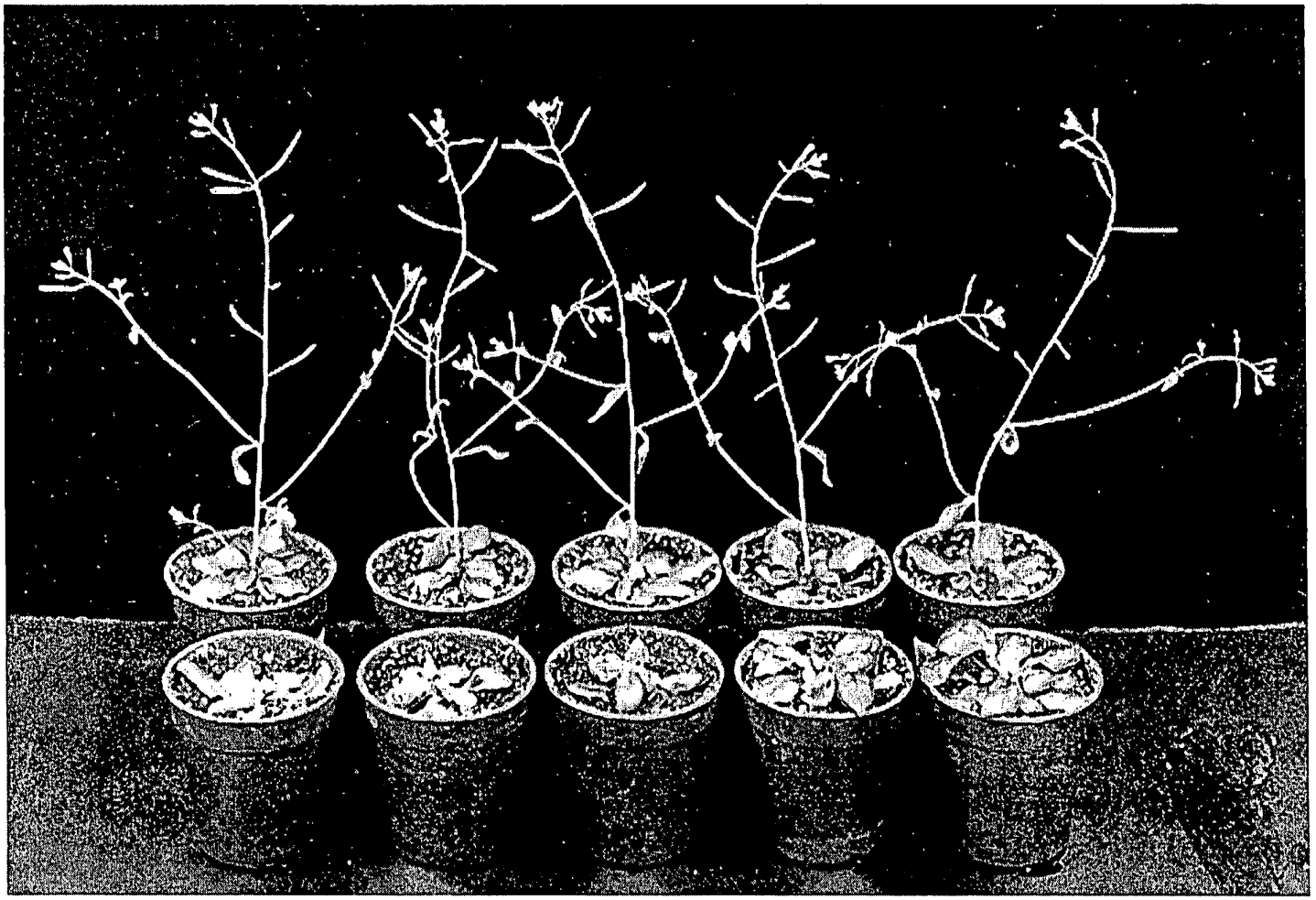
5641 cgagcaatgc aactcagcat tttcggcagc atggtaaaaa agatctcaat gttgattctt
5701 ttaaaggttg ttatcgatga acttctcgac taacctgaag gtttttatct tctgatattc
5761 tcgaatatag gttaatgtgt acagaaggag tgtaagtttc ggtgggatct ataataacaa
5821 gttacaagat aacttgttgt acaaaaaact tccactaaac ccagctcaag gtctcgtttc
5881 agccaaatca gaaagttcaa ttgtgaccaa gaagcagctt gaaacccgta aacatgcgtg
5941 tcagcttcct ctgaaagggg aaagcagcac aaggcaaaat acgatggttg aatcaagcga
6001 tgaagaagat gaagatgaag gaatcgttgt gagaatcgat tctccgagta aaatcgtttt

FIG. 7C

6061 caggaacgat ctatga

FIG. 7D

FIG. 8



Transgenic plants overexpressing *SOS1* and control plants that were transformed with vector only were compared for their salt tolerance. All plants were grown in soil on a long-day cycle (16 hours light, 8 hours dark). The first 13 days after germination the plants were watered with a diluted nutrient solution (1/8 MS) as needed. Starting on the 14th day, this solution was supplemented with NaCl. The supplementations consisted of four increasingly higher concentrations (50mM, 100mM, 150mM, and 200mM) of NaCl. The plants were treated for four days at each concentration, for a total of 16 days. On the 16th day the above picture was taken.

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